IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:		§		
	Wade D. Vinson, et al.	§	Confirmation No.	7167
		§		
Serial No.:	10/783,162	§	Group Art Unit:	3741
		§		
Filed:	February 20, 2004	§	Examiner:	Dwivedi, Vikansha S.
		§		
For:	COOLING FAN FOR ELECTRONIC DEVICE	§	Atty Docket:	200400249-1 HPQB:0016

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF TRANSMISSION OR MAILING
37 C.F.R. § 1.8

I hereby certify that this correspondence is being transmitted by facsimile to the United States Patent and Trademark Office in accordance with 37 C.F.R. § 1.6(d), or is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4), or is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date below:

July 14, 2009	**/Nathan E. Stacy/**
Date	Nathan E. Stacy

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in response to the Non-final Office Action mailed on April 1, 2009, and in furtherance of a Notice of Appeal filed May 19, 2009. In the Non-final Office Action of April 1, 2009, prosecution was reopened after an earlier Appeal Brief was submitted on December 10, 2008. The Appellants have chosen to reinstate the Appeal and address the Examiner's new arguments herein.

1. **REAL PARTY IN INTEREST**

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

2. **RELATED APPEALS AND INTERFERENCES**

The Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is the Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-13, 16-21 and 24-34 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal. Claims 14, 15, 22, and 23 have been canceled and are not subject to this appeal.

4. **STATUS OF AMENDMENTS**

There are no outstanding amendments to be considered by the Board.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The Application contains five independent claims, namely, claims 1, 11, 20, 25, 34 all of which are the subject of this Appeal. Each of the independent claims relate generally to a cooling fan (*e.g.*, 44) that may be placed in series with a backup fan (*e.g.*, 46) of the same design, wherein the airflow passes through *both* the operating fan (*e.g.*, 44 or 46) and the unpowered fan (*e.g.*, 46 or 44). *See* Specification, p. 5, ll. 1-23; Fig. 2. As the airflow is passing through an unpowered fan (*e.g.*, 44 or 46), it is important that the unpowered fan has minimal resistance to airflow. *See id.* at p. 8, l. 23-p.9, l. 6; Fig. 2. Thus, the impeller (*e.g.* 72) of the unpowered fan (*e.g.*, 44 or 46) should freely spin in the

airflow stream (*e.g.*, 58) from the powered fan (*e.g.*, 46 or 44), reducing resistance. *See id.* at p. 8, l. 23-p.9, l. 6; Figs. 2 and 6. Further, the design of the blades (*e.g.*, 78) may also lower the resistance to airflow when the fan (*e.g.*, 46 or 44) is idle, while still producing the desirable flow characteristics when operating. *See id.* at p. 10, ll. 4-23; Figs. 2 and 6. The application also contains dependent claims 2-10, 12, 13, 16-19, 21, 24, and 26-33. The subject matter of claims 1-13, 16-21, and 24-34 is summarized below.

With regard to independent claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 1 may relate to a cooling fan (*e.g.*, 44 or 46) for an electronic device (*e.g.*, 20). *See id.* at p. 4, ll. 16-26; Figs. 1 and 2. The cooling fan (*e.g.*, 44 or 46) may have a three-phase DC motor (*e.g.*, 80) that has a stator (*e.g.*, 100) and a rotor (*e.g.*, 102). *See id.* at p. 6, ll. 19-23; Figs. 5 and 6. The rotor (*e.g.*, 102) may be partially made from a rare earth magnet (*e.g.*, 132). *See id.* at p. 8, ll. 11-21; Fig. 6. Further, the cooling fan (*e.g.*, 44 or 46) may have an impeller (*e.g.*, 72) that includes a hub (*e.g.*, 76) to house the three-phase DC motor (*e.g.*, 80) and a plurality of blades (*e.g.*, 78) extending from the hub (*e.g.*, 76). *See id.* at p. 5, ll. 12-23; Figs. 2, 3 and 6. The impeller (*e.g.*, 72) has an impeller diameter (*e.g.*, D_I) and each blade (*e.g.*, 78) has a blade height (*e.g.*, H_B) that is at least 25 % of the impeller diameter (*e.g.*, D_I). *See id.* at p. 9, l. 8-p. 10, l. 2; Fig. 6.

With regard to claim 2, which depends from claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 2 each fan blade (*e.g.*, 78) may have a chord profile that increases in chord length (*e.g.*, C_1) from a region proximate to the hub (*e.g.*, 76) to a maximum chord length (*e.g.*, C_2) at a maximum chord length blade height (*e.g.*, H_{MCL}). *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 7.

With regard to claim 3, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 3, the maximum chord length blade height (*e.g.*, H_{MCL}) is approximately half the blade height (*e.g.*, H_B). *See id.*

With regard to claim 4, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 4, each blade (*e.g.*, 78) of the impeller (*e.g.*, 72) has a tip (*e.g.*, 142) and the chord profile decreases in chord length (*e.g.*, C_1) from the maximum chord length blade height (*e.g.*, H_{MCL}) to the tip (*e.g.*, 142) of the blade (*e.g.*, 78). *See id.*

With regard to claim 5, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 5, each blade (*e.g.*, 78) has a tip (*e.g.*, 142) and a stagger angle (*e.g.*, λ_1 and λ_2) of each blade (*e.g.*, 78) increases from the hub (*e.g.*, 76) to the tip (*e.g.*, 142) of the blade (*e.g.*, 78). *See id.* at p. 11, l. 15-p. 12, l. 2; Fig. 9.

With regard to claim 6, which depends from claim 5, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 6, each blade (*e.g.*, 78) has the stagger angle (*e.g.*, λ_1) of about 24 degrees to 30 degrees at the hub (*e.g.*, 76) and the stagger angle (*e.g.*, λ_2) of about 50 degrees to 56 degrees at the tip (*e.g.*, 142). *See id.*

With regard to claim 7, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 7, each blade (*e.g.*, 78) has a

tip (*e.g.*, 142) and a camber angle (*e.g.*, θ_1 and θ_2) that decreases from the hub (*e.g.*, 76) to the tip (*e.g.*, 142). *See id.* at p. 11, l. 15-p. 12, l. 2; Fig. 9.

With regard to claim 8, which depends from claim 6, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 8, each blade (*e.g.*, 78) has the camber angle (*e.g.*, θ_1 and θ_2) of about 26 degrees to 32 degrees at the hub (*e.g.*, 76) and about 9 degrees to 15 degrees at the tip (*e.g.*, 142). *See id.*

With regard to claim 9, which depends from claim 2, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 9, each impeller (*e.g.*, 72) has solidity (*e.g.*, S) of approximately one at the blade height (*e.g.*, H_{MCL}) corresponding to the maximum chord length (*e.g.*, C_2). *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 8.

With regard to claim 10, which depends from claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 10, the impeller (*e.g.*, 72) has seven blades (*e.g.*, 78). *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 7.

With regard to independent claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 11 may relate to an electronic device (*e.g.*, 20) that includes a first cooling fan (*e.g.*, 44 or 46). *See id.* at p. 4, ll. 16-26; Figs. 1 and 2. The first cooling fan (*e.g.*, 44 or 46) may include a motor and an impeller (*e.g.*, 72) having a hub (*e.g.*, 76) and a plurality of blades (*e.g.*, 78) extending from the hub (*e.g.*, 76) to a tip (*e.g.*, 142). *See id.* at p. 4, ll. 16-26; Fig. 3. Each blade (*e.g.*, 78) may have a chord profile that increases to a maximum chord length (*e.g.*, C_2) and decreases to a lesser chord length (*e.g.*, C_3), a stagger angle (*e.g.*, λ_1 and λ_2) that increases from the hub (*e.g.*,

76) to the tip (*e.g.*, 142) of the blade (*e.g.*, 78), and a camber angle (*e.g.*, θ_1 and θ_2) that decreases from the hub (*e.g.*, 76) to the tip (*e.g.*, 142). *See id.* at p. 10, l. 25-p. 11, l. 13-p. 11, l. 15-p. 12, l. 2; Figs. 7-9. The stagger angle (*e.g.*, λ_1 and λ_2) may increase from about 24 degrees to 30 degrees at the hub (*e.g.*, 76) to about 50 degrees to 56 degrees at the tip (*e.g.*, 142). *See id.* at p. 10, l. 25-p. 11, l. 13. The camber angle (*e.g.*, θ_1 and θ_2) may decrease from about 26 degrees to 32 degrees at the hub (*e.g.*, 76) to about 9 degrees to 15 degrees at the tip (*e.g.*, 142). *See id.*

With regard to claim 12, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 12, the impeller (*e.g.*, 72) has a solidity (*e.g.*, S) of approximately one at the maximum chord length (*e.g.*, C_2). *See id.*

With regard to claim 13, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 13, the maximum chord length (*e.g.*, C_2) is located at approximately forty percent of the full blade height (*e.g.*, HB). *See id.*

With regard to claim 16, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 16, the motor (*e.g.*, 80) is a three-phase DC motor comprising a stator (*e.g.*, 100) and a rotor (*e.g.*, 102) comprising a rare earth magnet (*e.g.*, 132). *See id.* at p. 6, ll. 19-23; Figs. 5 and 6.

With regard to claim 17, which depends from claim 16, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 17, the rare earth magnet (*e.g.*, 132) comprises bonded neodymium-iron-boron. *See id.* at p. 8, ll. 11-21.

With regard to claim 18, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 18, a second cooling fan (*e.g.*, 46 or 44) may be in series with the first cooling fan (*e.g.*, 44 or 46). *See* Specification, p. 5, ll. 1-10; Fig. 2. The second cooling fan (*e.g.*, 46 or 44) includes a motor (*e.g.*, 80), and an impeller (*e.g.*, 72) having a hub (*e.g.*, 76) and a plurality of blades (*e.g.*, 78) extending from the hub (*e.g.*, 76) to a tip (*e.g.*, 142). *See id.* at p. 5, ll. 12-23; Fig. 3. Each blade (*e.g.*, 78) has a chord profile that increases to a maximum chord length (*e.g.*, C_2) and decreases to a lesser chord length (*e.g.*, C_3), a stagger angle (*e.g.*, λ_1 and λ_2) that increases from the hub (*e.g.*, 76) to the tip (*e.g.*, 142) of the blade (*e.g.*, 78), and a camber angle (*e.g.*, θ_1 and θ_2) that decreases from the hub (*e.g.*, 76) to the tip (*e.g.*, 142). *See id.* at p. 10, l. 25-p. 11, l. 13-p. 11, l. 15-p. 12, l. 2; Figs. 7-9. More specifically, the stagger angle (*e.g.*, λ_1 and λ_2) may increase from about 24 degrees to 30 degrees at the hub (*e.g.*, 76) to about 50 degrees to 56 degrees at the tip (*e.g.*, 142). *See id.* at p. 11, l. 15-p. 12, l. 2. Further, the camber angle (*e.g.*, θ_1 and θ_2) may decrease from about 26 degrees to 32 degrees at the hub (*e.g.*, 76) to about 9 degrees to 15 degrees at the tip (*e.g.*, 142). *See id.*

With regard to claim 19, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 19, a bearing assembly (*e.g.*, 120) may support the impeller (*e.g.*, 72) and allow rotation. *See id.* at p. 7, l. 17-p. 8, l. 9; Fig. 6. The bearing assembly (*e.g.*, 120) may include a number of bearings (*e.g.*, 124 and 126) each having an outer diameter at least three times the inner diameter. *See id.*

With regard to independent claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 20 may relate to a method of manufacturing a redundant cooling fan (*e.g.*, 44 or 46) for an electrical device. *See id.* at p. 4, ll. 16-26.

The method may include manufacturing each blade (*e.g.*, 78) of the impeller (*e.g.*, 72) to have an increasing chord profile from a base region of the blade (*e.g.*, 78) to a maximum chord length (*e.g.*, C_2) at a specified blade height (*e.g.*, H_{MCL}). *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 7. Further, the method may include manufacturing each blade (*e.g.*, 78) with a stagger angle (*e.g.*, λ_1 and λ_2) that increases from the base region of the blade (*e.g.*, 78) to a tip (*e.g.*, 142) of each blade (*e.g.*, 78). *See id.* at p. 11, l. 15-p. 12, l. 2. The stagger angle (*e.g.*, λ_1 and λ_2) may be increased by about 24 degrees to 30 degrees at the base region of the blade (*e.g.*, 78) to about 50 degrees to 56 degrees at the tip (*e.g.*, 142) of the blade (*e.g.*, 78). *See id.* The method may also include manufacturing each blade (*e.g.*, 78) with a camber angle (*e.g.*, θ_1 and θ_2) that decreases from the base region of the blade (*e.g.*, 78) to the tip (*e.g.*, 142). *See id.* at p. 11, l. 15-p. 12, l. 2; Fig. 9. The camber angle (*e.g.*, θ_1 and θ_2) may be decreased from about 26 degrees to 32 degrees at the base region of the blade (*e.g.*, 78) to about 9 degrees to 15 degrees at the tip (*e.g.*, 142) of the blade (*e.g.*, 78). *See id.*

With regard to claim 21, which depends from claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 21 includes manufacturing each blade (*e.g.*, 78) of the impeller (*e.g.*, 72) to have a decreasing chord profile from the maximum chord length (*e.g.*, C_2) to a lesser chord length (*e.g.*, C_3) at the blade tip (*e.g.*, 142). *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 7.

With regard to claim 24, which depends from claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 24, includes manufacturing the impeller (*e.g.*, 72) with a solidity (*e.g.*, S) of approximately one at the maximum chord length (*e.g.*, C_2). *See id.* at p. 10, l. 25-p. 11, l. 13.

With regard to independent claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 25 may relate to a cooling fan (*e.g.*, 44 or 46) that includes a motor (*e.g.*, 80), an impeller (*e.g.*, 72) coupled to the motor (*e.g.*, 80), a fan housing to house the impeller (*e.g.*, 72), and a pair of finger guards (*e.g.*, 86) secured to opposite sides of the fan housing. *See id.* at p. 5, ll. 12-23-p. 5, l. 25-p. 6, l. 8; Fig. 3. Each finger guard (*e.g.*, 86) may be displaced outward relative to the fan housing. *See id.* at p. 5, l. 25-p. 6, l. 8. The fan housing may include a top that extends crosswise over the pair of finger guards (*e.g.*, 86) and overhangs the flow path outside the pair of finger guards (*e.g.*, 86). *See id.* at p. 6, ll. 10-17; Fig. 4.

With regard to claim 26, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 26, the motor (*e.g.*, 80) comprises a three-phase DC motor. *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 3.

With regard to claim 27, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 27, the impeller (*e.g.*, 72) includes a hub (*e.g.*, 76) and a plurality of blades (*e.g.*, 78) extending from the hub (*e.g.*, 76) to a tip (*e.g.*, 142). *See id.* at p. 5, ll. 12-23; Fig. 3. Each blade (*e.g.*, 78) may have a chord profile that increases to a maximum chord length (*e.g.*, C_2) and may decrease to a lesser chord length (*e.g.*, C_3), a stagger angle (*e.g.*, λ_1 and λ_2) that may increase from the hub (*e.g.*, 76) to the tip (*e.g.*, 142) of the blade (*e.g.*, 78), and a camber angle (*e.g.*, $\theta 1$ and $\theta 2$) that may decrease from the hub (*e.g.*, 76) to the tip (*e.g.*, 142). *See id.* at p. 10, l. 25-p. 11, l. 13-p. 11, l. 15-p. 12, l. 2; Figs. 7-9.

With regard to claim 28, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and

drawings. By way of example, in an embodiment of claim 28, the impeller (*e.g.*, 72) may have a solidity (*e.g.*, S) of one at the blade height (*e.g.*, H_{MCL}) corresponding to the maximum chord length (*e.g.*, C_2). *See id.* at p. 10, l. 25-p. 11, l. 13; Figs. 7 and 8.

With regard to claim 29, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 29, the top may generally be perpendicular to the opposite sides of the fan housing. *See id.* at p. 4, ll. 4-14; Figs. 1 and 2.

With regard to claim 30, which depends from claim 8, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 30, each blade (*e.g.*, 78) may have a stagger angle (*e.g.*, λ_1) of approximately 29 degrees at the hub (*e.g.*, 76) and a stagger angle (*e.g.*, λ_2) of approximately 56 degrees at the tip (*e.g.*, 142), and each blade (*e.g.*, 78) may have the camber angle (*e.g.*, θ_1) of approximately 29 degrees at the hub (*e.g.*, 76) and the camber angle (*e.g.*, θ_2) of approximately 12 degrees at the tip (*e.g.*, 142). *See id.* at p. 11, l. 15-p. 12, l. 2.

With regard to claim 31, which depends from claim 11, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 31, the stagger angle (*e.g.*, λ_1 and λ_2) may increase from approximately 29 degrees at the hub (*e.g.*, 76) to approximately 56 degrees at the tip (*e.g.*, 142). Further, the camber angle (*e.g.*, θ_1 and θ_2) may decrease from approximately 29 degrees at the hub (*e.g.*, 76) to approximately 12 degrees at the tip (*e.g.*, 142). *See id.*

With regard to claim 32, which depends from claim 20, discussions of the recited features can be found at least in the below-cited locations of the specification and

drawings. By way of example, an embodiment of claim 32 includes manufacturing a three-phase DC motor (*e.g.*, 80) comprising a stator (*e.g.*, 100) and a rotor (*e.g.*, 102) comprising a rare earth magnet (*e.g.*, 132). *See id.* at p. 8, ll. 11-21; Fig. 6. The stagger angle (*e.g.*, λ_1 and λ_2) of each blade (*e.g.*, 78) may increase from approximately 29 degrees at the base region of the blade (*e.g.*, 78) to approximately 56 degrees at the tip (*e.g.*, 142) of the blade (*e.g.*, 78). The camber angle (*e.g.*, θ_1 and θ_2) of each blade (*e.g.*, 78) may decrease from approximately 29 degrees at the base region of the blade (*e.g.*, 78) to approximately 12 degrees at the tip (*e.g.*, 142) of the blade (*e.g.*, 78). *See id.* at p. 11, l. 15-p. 12, l. 2.

With regard to claim 33, which depends from claim 25, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, in an embodiment of claim 33, the motor (*e.g.*, 80) is a three-phase DC motor comprising a stator (*e.g.*, 100) and a rotor (*e.g.*, 102) comprising a rare earth magnet (*e.g.*, 132). *See id.* at p. 8, ll. 11-21; Figs. 5 and 6. The impeller (*e.g.*, 72) may include a hub (*e.g.*, 76) and a plurality of blades (*e.g.*, 78) each extending from the hub (*e.g.*, 76) to a tip (*e.g.*, 142) of the respective blade (*e.g.*, 78). *See id.* at p. 5, ll. 12-23; Fig. 3. Each blade (*e.g.*, 78) may have a stagger angle (*e.g.*, λ_1 and λ_2) that increases from about 24 degrees to 30 degrees at the hub (*e.g.*, 76) to about 50 degrees to 56 degrees at the tip (*e.g.*, 142). *See id.* at p. 11, l. 15-p. 12, l. 2. Further, each blade (*e.g.*, 78) may have a camber angle (*e.g.*, θ_1 and θ_2) which decreases from about 26 degrees to 32 degrees at the hub (*e.g.*, 76) to about 9 degrees to 15 degrees at the tip (*e.g.*, 142). *See id.*

With regard to independent claim 34, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, an embodiment of claim 34 may relate to a cooling fan (*e.g.*, 44 or 46) for an electronic device (*e.g.*, 20). *See id.* at p. 4, ll. 16-26; Figs. 1 and 2. The cooling fan (*e.g.*, 44 or 46) may include a three-phase DC motor (*e.g.*, 80) comprising a stator (*e.g.*, 100)

and a rotor (*e.g.*, 102) comprising a rare earth magnet (*e.g.*, 132), an impeller (*e.g.*, 72) comprising a hub (*e.g.*, 76) to house the three-phase DC motor (*e.g.*, 80), and a plurality of blades (*e.g.*, 78) each extending from the hub (*e.g.*, 76) to a tip (*e.g.*, 142) of the respective blade (*e.g.*, 78). *See id.* at p. 4, ll. 16-26 and p. 8, ll. 11-21; Figs. 5 and 6. The impeller (*e.g.*, 72) generally has an impeller (*e.g.*, 72) diameter and each blade (*e.g.*, 78) may have a blade height (*e.g.*, HB) that is at least 25 % of the impeller (*e.g.*, 72) diameter. *See id.* at p. 9, l. 8-p. 10, l. 2. A fan housing may house the impeller (*e.g.*, 72). *See id.* at p. 5, ll. 12-23; Fig. 5. A pair of finger guards (*e.g.*, 86) may be secured to opposite sides of the fan housing, wherein each finger guard (*e.g.*, 86) may be displaced outward relative to the fan housing. *See id.* at p. 5, ll. 12-23; Figs. 3 and 4. The fan housing may include a top that extends crosswise over the pair of finger guards (*e.g.*, 86) and overhangs the flow path outside the pair of finger guards (*e.g.*, 86). *See id.* at p. 5, ll. 12-23; Fig. 4. Each blade (*e.g.*, 78) may have a stagger angle (*e.g.*, λ_1 and λ_2) which increases from about 24 degrees to 30 degrees at the hub (*e.g.*, 76) to about 50 degrees to 56 degrees at the tip (*e.g.*, 142). *See id.* at p. 10, l. 25-p. 11, l. 13; Fig. 9. Further, each blade (*e.g.*, 78) may have a camber angle (*e.g.*, $\theta 1$ and $\theta 2$) which decreases from about 26 degrees to 32 degrees at the hub (*e.g.*, 76) to about 9 degrees to 15 degrees at the tip (*e.g.*, 142). *See id.*

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

First Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claim 1 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,652,470 to Von der Heide et al. (hereinafter "Von der Heide") in view of U.S. Patent No. 5,280,209 to Leupold (hereinafter "Leupold").

Second Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of U.S. Patent No. 1,755,633 to Dehmer (hereinafter "Dehmer").

Third Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's third ground of rejection in which the Examiner rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of U.S. Patent No. 6,129,528 to Bradbury (hereinafter "Bradbury").

Fourth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's fourth ground of rejection in which the Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide, Yokozawa, and Leupold and further in view of U.S. Patent No. 5,184,938 to Harmsen (hereinafter "Harmsen").

Fifth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's fifth ground of rejection in which the Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of U.S. Patent No. 5,588,804 to Neely (hereinafter "Neely").

Sixth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's sixth ground of rejection in which the Examiner rejected claims 11, 13, 16, 17, 19, 20, 21, and 30-33 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, and Harmsen.

Seventh Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's seventh ground of rejection in which the Examiner rejected claims 25, 26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and in further view of U.S. Patent No. 5,445,215 to Herbert (hereinafter "Herbert").

Eighth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's eighth ground of rejection in which the Examiner rejected claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and in further view of Herbert, Dehmer, Bradbury, and Harmsen

Ninth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's ninth ground of rejection in which the Examiner rejected claims 9, 12 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, and Harmsen and further in view of U.S. Publication No. 2004/0170501 by Seki (hereinafter "Seki").

Tenth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's tenth ground of rejection in which the Examiner rejected claim 28 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and in further view of Herbert and Seki.

Eleventh Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's eleventh ground of rejection in which the Examiner rejected claim 18 under 35 U.S.C. §

103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, and Harmsen and further in view of U.S. Patent No. D-398,978 to Horng (hereinafter "Horng").

Twelfth Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's twelfth ground of rejection in which the Examiner rejected claim 34 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, Harmsen, Herbert and Horng.

7. ARGUMENT

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under 35 U.S.C. § 103(a). Accordingly, the Appellants respectfully request full and favorable consideration by the Board, as the Appellants assert that claims 1-13, 16-21, and 24-34 are currently in condition for allowance.

As a preliminary matter, the Appellants respectfully note that several of the rejections were inconsistent or were missing information. To begin, the Examiner apparently removed a reference upon the reopening of prosecution. This reference, U.S. Patent No. 5,650,678 to Yokozawa et al. (hereinafter "Yokozawa"), was cited against independent claim 1 in the previous Final Office Action mailed on July 21, 2008, but was not used in the rejection of independent claim 1 in the Non-final Office Action mailed April 1, 2009. However, the Appellants respectfully note that Yokogawa is listed in the opening lines of two rejections of dependent claims in the Non-final Office Action. Specifically, claims 2-4 were rejected under 35 U.S.C. § 103(a) as allegedly "being unpatentable over Von der Heide, Yokozawa, Leupold and further in view of Dehmer." Non-final Office Action, p. 4. Yokozawa was also mentioned in the header of the

rejection of claims 7 and 8. *See id.* at 5. The Appellants assume that the removal of Yokozawa applies to all further claims, since it is not discussed in the text of any of the rejections in the present Non-final Office Action. Therefore, Yokozawa is not discussed further, below.

Furthermore, the Appellants respectfully note that the actual citations for numerous references were not provided in the Non-final Office Action, including the citations for Von der Heide, Dehmer, Harmsen, Neely, Bradbury, Herbert, and Seki. Based on the similarities of the rejections to the rejections set forth in the previous Final Office Action mailed on July 21, 2008, the Appellants assume that these are the same references as previously cited.

A. **Ground of Rejection No. 1**

The Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide in view of Leupold.

Legal Precedent and Guidelines

The burden of establishing a prima facie case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). To *establish prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka, 180 U.S.P.Q.* 580 (C.C.P.A. 1974). However, it is not enough to show that all the elements exist in the prior art since a claimed invention composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR International Co.* v. *Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). It is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* Specifically, there must be some articulated reasoning with a rational underpinning to support a conclusion

of obviousness; a conclusory statement will not suffice. *In* re *Kahn,* 441 F.3d 977, 988 (Fed. Cir. 2006). Indeed, the factual inquiry determining whether to combine references must be thorough and searching, and it must be based on *objective evidence of record. In re Lee, 61* U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002).

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc.* v. *Rudkin-Wiley Corp.,* 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine,* 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, "fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *In re Dembiczak,* F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc., 721* F.2d 1540, 1553,220 U.S.P.Q. 303,313 (Fed. Cir. 1983)).

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claim 1.

Turning to the claims, amended independent claim 1 recites, *inter alia,* "an impeller comprising a hub to house the three-phase DC motor and a plurality of blades extending from the hub, wherein the impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter." The cited references, taken alone or in hypothetical combination, fail to teach or suggest each blade having a blade height of "at least 25% of the impeller diameter," as recited by claim 1.

In contrast to the recitations of claim 1, Von der Heide merely discloses a drive motor that has an external rotor that "can support a load member such as, for example,

one or more discs in a disc drive or a fan wheel having a number of fan blade." Von der Heide, col. 1, ll. 31-33. Further, Von der Heide shows two fan blades (139, 141) attached to a circumferential wall 17B of a rotor housing 17. *See id.*, col. 4, ll. 6-9. However, Von der Heide provides no details about the design of the fan blades, and certainly does not disclose that "each blade has a blade height that is at least 25 % of the impeller diameter," as recited in claim 1.

Leupold does not remedy the deficiencies of Von der Heide, either alone or in any hypothetical combinations. Instead, Leupold is directed to a magnet structure for use in electric machinery. *See* Leupold, col. 1, ll.51-54. Leupold does not disclose any fan blades, whatsoever, or even the use of the magnetic structure in a fan motor. Accordingly, Leupold does not disclose that "each blade has a blade height that is at least 25 % of the impeller diameter," as recited in claim 1.

Finally, the Examiner stated that

> **With regard to claim limitation blades being at least 25 % of the impeller diameter it should be clear that "blades being at least 25 % of the impeller diameter" presents no novel or unexpected result over the blade and impeller diameter relationship (Also, applicant explains on page 10 and 11 of the specification how the blade height ("HB" in the illustrated embodiment is approximately 25 % of the impeller diameter ("1")), as compared to 20 % of the impeller diameter in a fan using a conventional DC motor. This enables the impeller 72 to displace a greater amount of air for each rotation of the impeller than an impeller of a comparable fan powered by a conventional DC motor used in the references.** Such a relationship between the blade height and the impeller diameter in lieu of those used in the references solves no stated problem and would be an obvious matter of design choice within the skill of the art.

Non-final Office Action, p. 4 (bold in original, underline added for emphasis). However, the Examiner has provided no references to support the conclusory statements that

"'blades being at least 25 % of the impeller diameter' presents no novel or unexpected result over the blade and impeller diameter relationship," or that this would be "an obvious matter of design choice." *Id.* In fact, the Examiner has provided no references, whatsoever, that mention the existence of a "blade and impeller diameter relationship," outside of the Appellants' own application. Nor has the Examiner provided any references for electronic cooling fans that indicate that blade height was a choice at all at the time of filing, much less "an obvious design choice," as alleged.

Furthermore, *the Examiner has referenced the Description of Specific Embodiments portion of the Appellants' own application in support of the allegation of obviousness. See id.* The Examiner's apparent reliance on statements from the Appellants' application is patently improper, as the current Application cannot be considered an appropriate reference under either 35 U.S.C. §§ 102 or 103. Further, as noted in the Legal Precedent and Guidelines section above, the Federal Circuit has warned that the Examiner must not "fall victim to the insidious effect of a hindsight syndrome wherein *that which only the inventor taught is used against its teacher*." *In re Dembiczak,* F.3d at 999, 50 U.S.P.Q.2d 52. (emphasis added). Accordingly, the Examiner's conclusory statement cannot remedy the deficiencies of Von der Heide and Leupold.

For at least the reasons above, the cited references, either alone or in any hypothetical combination, cannot render obvious independent claim 1 and its dependent claims 2-10. Accordingly, reversal of this rejection is respectfully requested.

B. **Ground of Rejection No. 2:**

The Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer. The Appellants note that claims 2-4 depend from claim 1, and respectfully

assert that these claims are allowable over Von der Heide and Leupold for at least the reasons stated above with respect to the first grounds of rejection.

Further, Dehmer does not remedy the deficiencies of Von der Heide and Leupold, alone or in any hypothetical combinations with these references. Instead, Dehmer is directed to a screw propeller having a more efficient profile for interaction with water. *See* Dehmer, p. 1, ll. 1-5. Dehmer does not disclose "an impeller comprising a hub to house the three-phase DC motor and a plurality of blades extending from the hub, wherein the impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter," as recited by claim 1, nor does the Examiner claim that it does. Reversal of this rejection is therefore respectfully requested.

C. **Ground of Rejection No. 3:**

The Appellants respectfully urge the Board to review and reverse the Examiner's third ground of rejection in which the Examiner rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Bradbury. The Appellants note that claims 5 and 6 depend from claim 1, and respectfully assert that these claims are allowable over the cited references for at least the reasons stated above with respect to the first grounds of rejection.

Furthermore, claim 6 recites that "each blade has the stagger angle of about 24 degrees to 30 degrees at the hub and the stagger angle of about 50 degrees to 56 degrees at the tip." Von der Heide and Leupold are entirely silent on the issue of stagger angle. In fact, the Examiner has apparently relied exclusively on Bradbury as the one reference which discloses the concept of a stagger angle. However, Bradbury only discloses one specific dimensional value for stagger angle at the hub and tip of a blade in claim 12 and Fig. 20. In each of these locations in Bradbury, the stagger angle is characterized as increasing from a value of 41.8 degrees at the hub of a blade to a value of 65.7 degrees at the tip of a blade. There is no mention of stagger angle ranges at either the root or the tip,

only discrete values are disclosed. In addition, neither of these discrete values fall within the ranges claimed in independent claims 11 and 20. *See In re Wertheim*, 191 U.S.P.Q. 90 (C.C.P.A. 1976) (stating that a *prima facie* case of obviousness exists where the claim ranges "overlap or lie inside ranges disclosed by the prior art."). For instance, 41.8 degrees at the hub does not fall within or even near the range of 24-30 degrees as claimed and 65.7 degrees at the tip does not fall within or even near the range of 50-56 degrees as claimed.

Thus, for at least these additional reasons, dependent claim 6 is allowable over the references cited. Reversal of this rejection is therefore respectfully requested.

D. **Ground of Rejection No. 4:**

The Appellants respectfully urge the Board to review and reverse the Examiner's fourth ground of rejection in which the Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Harmsen. The Appellants respectfully note that claims 7 and 8 depend from claim 1 and assert that these claims are allowable over the cited references for at least the reasons stated above with respect to the first grounds of rejection.

Furthermore, claim 8 recites "each blade has the camber angle of about 26 degrees to 32 degrees at the hub and about 9 degrees to 15 degrees at the tip." With respect to claim 8, the Examiner stated:

> Von der Heide view of Leupold and further in view of Harmsen teaches the invention except claimed range, however it fails to patentably distinguish over Von der Heide in view of Leupold and further in view of Harmsen and would have been within the level of one of ordinary skill in the art at the time the invention was made. It has been held that "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine

> experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955), MPEP 2144.05 II.

Final Office Action, page 6.

However, the Appellants contend that the situation discussed in M.P.E.P. § 2144.05 II and *In re Aller* is quite different and, therefore, inapposite. More specifically, in *In re Aller,* the prior art reference showed essentially the same chemical process as the recited claims except that the experiment in the prior art reference was conducted at a temperature of 100°C and with a 10% sulphuric acid solution while the claims recited a 25-70% sulphuric acid solution at temperatures of 40-80°C. *See In re Aller,* 105 U.S.P.Q. at 234. Therefore, in that situation, the prior art reference disclosed workable values. In contrast, in the present situation, the prior art reference discloses only that the camber angle "has a forward curvature which decreases at an increasing distance from the hub 11." *See* Harmsen, col. 3, ll. 32-34. This passage encompasses the entire extent of the disclosure regarding adjusting camber angles in Harmsen. Therefore, Harmsen gives no guidance as to what might be appropriate camber angles at the hub or the tip of the blade. It cannot be true that by making such a broad statement, Harmsen has captured the entirety of workable camber angle ranges.

In fact, Section 2144.05 of the Manual of Patent Examining Procedure specifically states:

> However, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. *Id.* See also *In re Baird,* 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones,* 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08.

M.P.E.P. § 2144.05(1).

The Appellants contend that in the present situation, by encompassing all of the workable camber angle ranges, the passage made in Harmsen may, at most, be interpreted as claiming a genus whereas dependent claim 8 claims a species. The fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a *prima facie* case of obviousness. *In re Baird,* 16 F.3d at 382, 9 U.S.P.Q.2d at 1552 ("The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious."). Therefore, the conclusory statement that it "would have been within the level of one of ordinary skill in the art at the time the invention was made" to use the claimed ranges for camber angles is insufficient to support a *prima facie* case of obviousness with respect to dependent claim 8.

As none of the other cited references mention camber angle, they cannot obviate the deficiencies of Harmsen. Accordingly, the Appellants respectfully assert that dependent claim 8 is allowable over the cited references for at least this additional reason. The Appellants respectfully request the Board to reverse this rejection.

E. **Ground of Rejection No. 5:**

The Appellants respectfully urge the Board to review and reverse the Examiner's fifth ground of rejection in which the Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Neely. The Appellants note that claim 10 depends from claim 1 and respectfully assert that this claims is allowable over Von der Heide and Leupold for at least the reasons stated above with respect to the first grounds of rejection.

Further, Neely does not remedy the deficiencies of Von der Heide and Leupold. Instead Neely is directed to an airfoil for use in an engine cooling fan. *See* Neely, col. 5, ll. 32-35. Nothing in Neely teaches or suggests "an impeller comprising a hub to house the three-phase DC motor and a plurality of blades extending from the hub, wherein the

impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter," as recited in claim 1. Reversal of this rejection is respectfully requested.

F. **Ground of Rejection No. 6:**

The Appellants respectfully urge the Board to review and reverse the Examiner's sixth ground of rejection in which the Examiner rejected claims 11, 13, 16, 17, 19, 20, 21, and 30-33 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, and Harmsen. The Appellants respectfully traverse this rejection. As a preliminary matter, the Appellants note that claim 33 depends from claim 25 (as noted in the previously filed Appeal Brief). Accordingly, the Appellants have chosen to discuss this claim with claim 25 under the seventh ground of rejection.

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claims 11 and 20.

Independent claim 11 recites, *inter alia*:

> The stagger angle increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip; or the camber angle decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip; or a combination thereof.

Similarly, independent claim 20 recites, *inter alia*:

> The stagger angle increases from about 24 degrees to 30 degrees at the base region of the blade to about 50 degrees to 56 degrees at the tip of the blade; or the camber angle decreases from about 26 degrees to 32 degrees at the base region of the blade to about 9 degrees to 15 degrees at the tip of the blade; or a combination thereof.

As discussed with respect to the third ground of rejection, the cited references, taken alone or in hypothetical combination, fail to teach or suggest each blade having

stagger angles which fall within the specific ranges recited in independent claims 11 and 20. Accordingly, for at least the same reasons, the cited references do not make obvious independent claims 11 and 20, which recite the same ranges.

Furthermore, as discussed with respect to the fourth ground of rejection, the cited references, taken alone or in hypothetical combination, fail to teach or suggest each blade having camber angles which fall within the specific ranges recited in independent claims 11 and 20. Accordingly, for at least the same reasons, the cited references do not make obvious independent claims 11 and 20, which recite the same ranges.

In view of these deficiencies among others, the cited references, taken alone or in hypothetical combination, cannot render obvious the current independent claims 11 and 20 and their dependent claims 13, 16, 17, 19, 21, and 30-32. Reversal of this rejection is therefore respectfully requested.

G. **Ground of Rejection No. 7:**

The Appellants respectfully urge the Board to review and reverse the Examiner's seventh ground of rejection in which the Examiner rejected claims 25, 26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Herbert. The Appellants respectfully traverse this rejection. As noted above, the Appellants have chosen to discuss claim 33, which depends from claim 25, with claim 25.

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claim 25.

Amended independent claim 25 recites, *inter alia,* "the fan housing comprises a top that extends *crosswise* over the pair of finger guards and *overhangs* the flow path outside the pair of finger guards." The cited references, taken alone or in hypothetical combination, fail to teach or suggest the foregoing features of independent claim 25.

In rejecting independent claim 25 under 35 U.S.C. § 103, the Examiner failed to address how the cited references teach or suggest an overhanging top piece of the fan housing. Moreover, the Appellants find no mention of such an overhanging top piece of the fan housing in any of the cited references. Although the Appellants do not intend or suggest that the specification should be read into the claims, the Appellants submit that the specification and figures clearly support the present claim language. For example, the Appellants' specification discloses:

> As illustrated in FIG. 4, a gap 90 is provided between the impellers 72 of the two fans to enable the air 58 to stabilize before it enters the second fan 46, reducing air resistance further. As noted above, the amount of audible noise generated is reduced by reducing the resistance to air flow. *The top 88 of each fan housing 70 has an overhang 92 that covers the gap 90 between the first fan 44 and the second fan 46 to prevent air from being diverted into the server 20, rather than to the second fan 46.* Preferably, the impeller 72 of the idle fan is able to spin freely. The resistance to the flow of air of a non-operating fan is greater when the impeller 72 is locked than it is when the impeller 72 is able to spin freely.

See Application, p. 5, l. 25-p. 6, l. 8; FIG. 4 (emphasis added). Again, the cited references are clearly missing the "the fan housing comprises a top that extends crosswise over the pair of finger guards and *overhangs* the flow path *outside* the pair of finger guards," as recited by claim 25 and clearly illustrated in Fig. 4. In view of these deficiencies among others, the cited references, taken alone or in hypothetical combination, cannot render obvious the current independent claim 25 and its dependent claims.

In view of these deficiencies among others, the cited references, taken alone or in hypothetical combination, cannot render obvious independent claims 25 and its

dependent claims 26, 29, and 33. Accordingly, the Appellants respectfully request reversal of this rejection.

H. **Ground of Rejection No. 8:**

The Appellants respectfully urge the Board to review and reverse the Examiner's eighth ground of rejection in which the Examiner rejected claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Herbert, Dehmer, Bradbury, and Harmsen. As claim 27 depends from claim 25, it is allowable over Von der Heide, Leupold and Herbert for the same reasons as discussed with respect to the seventh ground of rejection. Furthermore, Dehmer, Bradbury, and Harmsen do not disclose any sort of finger guards, whatsoever, and, thus, do not obviate the deficiencies of Von der Heide, Leupold and Herbert with respect to claim 25 or its dependent claim 27. Therefore, the Appellants respectfully request reversal of this rejection.

I. **Ground of Rejection No. 9:**

The Appellants respectfully urge the Board to review and reverse the Examiner's ninth ground of rejection in which the Examiner rejected claims 9, 12 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold further in view of Dehmer, Bradbury, and Harmsen and Seki. The Appellants note that claim 9 depends from claim 1 and is allowable for at least the same reasons as discussed in the first ground of rejection, as Seki does not obviate the deficiencies of the other references cited. Claims 12 and 24 depend from claims 11 and 20 and are allowable for at least the same reasons as discussed in the sixth ground of rejection, as Seki does not obviate the deficiencies of the references cited therein.

Furthermore, the solidity recited in claims 9, 12, and 24 is defined in the present Specification as "the ratio of the *chord length* to the *spacing ("S")* between the blades." *See* Specification, p. 10, ll. 4-23 (emphasis added); Figs. 7 and 8. In contrast, the term

"solidity" as used in Seki, is calculated by the equation *N*C/R*, where *N is the number* of two dimension blades, *C is the "cord length,"* and *R is the radius* from the axis to the center of a two-dimensional blade. *See* Seki, para. [0013]; Fig. 1. This term has very little in common with the term solidity as recited in claims 9, 12, and 24 and, thus, any numerical similarity between the results calculated by these different methods is meaningless. Indeed, if the solidity of the apparatus in the Seki application were to be calculated using the method described in the present application, the numbers would be much lower than 1, given the very large spacing between the blades. Thus, the "solidity" term used by Seki does not make the present claims obvious. Further, none of the other references cited, either alone or in any hypothetical combination, obviates the deficiencies of Seki. Accordingly, for at least this additional reason, claims 9, 12, and 24 are allowable over the cited references. Reversal of this rejection is respectfully requested.

J. **Ground of Rejection No. 10:**

The Appellants respectfully urge the Board to review and reverse the Examiner's tenth ground of rejection in which the Examiner rejected claim 28 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Herbert and Seki. As claim 28 depends from claim 25, the Appellants respectfully assert that it is allowable for the same reasons as discussed with respect to the seventh ground of rejection.

Further, the Appellants respectfully assert that the solidity term recited in claim 28 has nothing in common with the "solidity" term used in Seki, as discussed with respect to the ninth ground of rejection. As none of the other references cited by the Examiner mention solidity and, thus, do not obviate the deficiencies of Seki, the Appellants respectfully assert that claim 28 is allowable over Seki for at least this additional reason. The Appellants respectfully request reversal of this rejection.

K. **Ground of Rejection No. 11:**

The Appellants respectfully urge the Board to review and reverse the Examiner's eleventh ground of rejection in which the Examiner rejected claim 18 under 35 U.S.C. § 103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, and Harmsen and further in view of Horng. The Appellants respectfully assert that Horng does not obviate the deficiencies of the other references cited. Therefore, as claim 18 depends from claim 11, it is allowable for the same reasons discussed in the sixth ground of rejection.

Furthermore, claim 18 recites "a second cooling fan *in series* with the first cooling fan." (Emphasis added). In this context, "in series" indicates that the airflow from the first fan directly passes through the second fan. This is clearly described in the specification, which states, *inter alia*, that "depending upon which of the two fans is operating, either the first fan 44 is blowing air 58 *through* the second fan 46 or the second fan 46 is drawing air 58 *through* the first fan 46." *See* Specification, p. 5, ll. 1-10 (emphasis added). This is further illustrated in Fig. 2, which shows the airflow through the fans.

In contrast, Horng clearly shows the two fans are *parallel* to each other. *See* Horng, Figs.1, 2, 8, and 9. The *parallel* arrangement of Horng does not make a *series* arrangement obvious. None of the other references cited discuss a *series* configuration of fans and, thus, do not obviate the deficiencies of Horng. Accordingly, for at least this additional reason, the Appellants assert that claim 18 is allowable over the cited references. Reversal of this rejection is therefore respectfully requested.

L. **Ground of Rejection No. 12:**

The Appellants respectfully urge the Board to review and reverse the Examiner's twelfth ground of rejection in which the Examiner rejected claim 34 under 35 U.S.C. §

103(a) as being unpatentable over Von der Heide and Leupold and further in view of Dehmer, Bradbury, Harmsen, Herbert and Horng.

Independent claim 34 recites, *inter alia*, that "each blade has a blade height that is at least 25 % of the impeller diameter." As discussed above, none of the cited references, alone or in any hypothetical combination, discloses this element.

Further, claim 34 recites, *inter alia*, that "the fan housing comprises a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards." As discussed above with respect to the seventh ground of rejection, none of the cited references, alone or in any hypothetical combination, makes this obvious.

Finally, claim 34 recites, *inter alia*, that

> Each blade has a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip, or each blade has a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip, or a combination thereof.

As discussed above with respect to the fourth and sixth grounds of rejection, none of the cited references, alone or in any hypothetical combination, makes this obvious.

As a final observation on the rejections discussed in grounds one through twelve, above, the Appellants respectfully note that the Examiner's rejections appear to be based on hindsight reconstruction. More specifically, the Examiner appears to be picking and choosing among various prior art references without regard to the requisite obviousness of making such combinations, *e.g.*, as indicated by the references themselves. Instead, the Examiner has used the Appellants' disclosure as a guide for hindsight reconstruction of the present claims. This contention is supported by the Examiner's express citation of

the application itself to support the obviousness rejection discussed with respect to the first ground of rejection. Such hindsight reconstruction is clearly improper and cannot be used to formulate rejections under 35 U.S.C. § 103. Accordingly, the Appellants request reversal of the rejections discussed herein.

M. **Request for Reversal of Rejections**

For at least the reasons discussed above, the Appellants assert that the references cited, alone or in any sort of hypothetical combination, cannot make claims 1-13, 16-21 and 24-34 obvious. Therefore, the Appellants respectfully request that the Board reverse the Examiner's rejections of claims 1-13, 16-21 and 24-34 under 35 U.S.C. § 103.

Conclusion

The Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: July 14, 2009

/Nathan E. Stacy/
Nathan E. Stacy
Reg. No. 52,249
International IP Law Group
P.O. Box 691927
Houston, TX 77269-1927
(832) 375-0200

CORRESPONDENCE ADDRESS:
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

8. **APPENDIX OF CLAIMS ON APPEAL**

Listing of Claims:

1. A cooling fan for an electronic device, comprising:

a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet; and

an impeller comprising a hub to house the three-phase DC motor and a plurality of blades extending from the hub, wherein the impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter.

2. The cooling fan as recited in clain1 1, wherein each blade has a chord profile that increases in chord length from a region proximate to the hub to a maximum chord length at a maximum chord length blade height.

3. The cooling fan as recited in claim 2, wherein the maximum chord length blade height is approximately half the blade height.

4. The cooling fan as recited in claim 2, wherein each blade of the impeller has a tip and the chord profile decreases in chord length from the maximum chord length blade height to the tip of the blade.

5. The cooling fan as recited in claim 2, wherein each blade has a tip and a stagger angle of each blade increases from the hub to the tip of the blade.

6. The cooling fan as recited in claim 5, wherein each blade has the stagger angle of about 24 degrees to 30 degrees at the hub and the stagger angle of about 50 degrees to 56 degrees at the tip.

7. The cooling fan as recited in claim 2, wherein each blade has a tip and a camber angle that decreases from the hub to the tip.

8. The cooling fan as recited in claim 6, wherein each blade has the camber angle of about 26 degrees to 32 degrees at the hub and about 9 degrees to 15 degrees at the tip.

9. The cooling fan as recited in claim 2, wherein each impeller has solidity of approximately one at the blade height corresponding to the maximum chord length.

10. The cooling fan as recited in claim 1, wherein the impeller has seven blades.

11. An electronic device, comprising:

a first cooling fan, comprising:

a motor; and

an impeller having a hub and a plurality of blades extending from the hub to a tip, wherein each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip;

wherein:

the stagger angle increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip; or

the camber angle decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip;

or a combination thereof.

12. The electronic device as recited in claim 11, wherein the impeller has a solidity of approximately one at the maximum chord length.

13. The electronic device as recited in claim 11, wherein the maximum chord length is located at approximately forty percent of the full blade height.

16. The electronic device as recited in claim 11, wherein the motor is a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet.

17. The electronic device as recited in claim 16, wherein the rare earth magnet comprises bonded neodymium-iron-boron.

18. The electronic device as recited in claim 11, comprising:

a second cooling fan in series with the first cooling fan, the second cooling fan comprising:

a motor; and

an impeller having a hub and a plurality of blades extending from the hub to a tip, wherein each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip;

wherein:

the stagger angle increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip; or

the camber angle decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip;

or a combination thereof.

19. The electronic device as recited in claim 11, comprising a bearing assembly operable to rotatably support the impeller, wherein the bearing assembly comprises a plurality of bearings each having an outer diameter at least three times the inner diameter.

20. A method of manufacturing a redundant cooling fan for an electrical device, comprising;

manufacturing each blade of the impeller to have an increasing chord profile from a base region of the blade to a maximum chord length at a specified blade height; manufacturing each blade with a stagger angle that increases from the base region of the blade to a tip of each blade; and

manufacturing each blade with a camber angle that decreases from the base region of the blade to the tip;

wherein:

the stagger angle increases from about 24 degrees to 30 degrees at the base region of the blade to about 50 degrees to 56 degrees at the tip of the blade; or

the camber angle decreases from about 26 degrees to 32 degrees at the base region of the blade to about 9 degrees to 15 degrees at the tip of the blade; or a combination thereof.

21. The method as recited in claim 20, comprising manufacturing each blade of the impeller to have a decreasing chord profile from the maximum chord length to a lesser chord length at the blade tip.

24. The method as recited in claim 20, comprising manufacturing the impeller with a solidity of approximately one at the maximum chord length.

25. A cooling fan comprising:

a motor;

an impeller coupled to the motor;

a fan housing to house the impeller; and

a pair of finger guards secured to opposite sides of the fan housing, each finger guard being displaced outward relative to the fan housing,

wherein the fan housing comprises a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards.

26. The cooling fan as recited in claim 25, wherein the motor comprises a three-phase DC motor.

27. The cooling fan as recited in claim 25, wherein the impeller comprises a hub and a plurality of blades extending from the hub to a tip, wherein each blade has a chord profile that increases to a maximum chord length and decreases to a lesser chord length, a stagger angle that increases from the hub to the tip of the blade, and a camber angle that decreases from the hub to the tip.

28. The cooling fan as recited in claim 25, wherein the impeller has a solidity of one at the blade height corresponding to the maximum chord length.

29. The cooling fan as recited in claim 25, wherein the top is generally perpendicular to the opposite sides of the fan housing.

30. The cooling fan as recited in claim 8, wherein each blade has the stagger angle of approximately 29 degrees at the hub and the stagger angle of approximately 56 degrees at the tip, and each blade has the camber angle of approximately 29 degrees at the hub and the camber angle of approximately 12 degrees at the tip.

31. The electronic device as recited in claim 11, wherein the stagger angle increases from approximately 29 degrees at the hub to approximately 56 degrees at the tip, and the camber angle decreases from approximately 29 degrees at the hub to approximately 12 degrees at the tip.

32. The method as recited in claim 20, comprising manufacturing a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet, and

wherein the stagger angle increases from approximately 29 degrees at the base region of the blade to approximately 56 degrees at the tip of the blade, and the camber angle decreases from approximately 29 degrees at the base region of the blade to approximately 12 degrees at the tip of the blade.

33. The cooling fan as recited in claim 25, wherein the motor is a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet, and

wherein the impeller comprises a hub and a plurality of blades each extending from the hub to a tip of the respective blade, wherein each blade has a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip, or each blade has a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip, or a combination thereof.

34. A cooling fan for an electronic device, comprising:

a three-phase DC motor comprising a stator and a rotor comprising a rare earth magnet;

an impeller comprising a hub to house the three-phase DC motor, and a plurality of blades each extending from the hub to a tip of the respective blade, wherein the impeller has an impeller diameter and each blade has a blade height that is at least 25 % of the impeller diameter;

a fan housing to house the impeller; and

a pair of finger guards secured to opposite sides of the fan housing, each finger guard being displaced outward relative to the fan housing, wherein the fan housing comprises a top that extends crosswise over the pair of finger guards and overhangs the flow path outside the pair of finger guards;

wherein each blade has a stagger angle which increases from about 24 degrees to 30 degrees at the hub to about 50 degrees to 56 degrees at the tip, or each blade has a camber angle which decreases from about 26 degrees to 32 degrees at the hub to about 9 degrees to 15 degrees at the tip, or a combination thereof.

9. **EVIDENCE APPENDIX**

None.

10. **RELATED PROCEEDINGS APPENDIX**

None.